



this fashion and released. On January 9, 1960, six of these marked animals were recovered and measured. It was found that they had attained a length of 16.3 to 23.4 millimeters. The return of only approximately three percent, in spite of prolonged and careful search, was considered insufficient to allow making any conclusions of value as to the growth rate of this species. A much larger number of marked animals was desired, but the mechanical difficulties of marking them adequately with a triangular file was a serious handicap. As a further experiment, another group of *Olivella* was collected in the Flood Control Channel area on July 16, 1960. Of approximately 1'500 specimens, 266 were selected in the size class 16.0 to 18.0 millimeters. The marks were made with a dental drill, and while the shell was still dry from the friction exerted by the action of the drill, the groove was covered with India ink. These animals were then returned as usual.

On November 6, 1960, 964 animals were collected in the Flood Control Channel; of these, five were clearly marked ones, but included one dead shell. The measurements ranged from 18.6 to 20.25 millimeters. On January 28, 1961, a total of 754 specimens was collected, including seven marked ones. The sizes of these ranged from 18.8 to 21.9 millimeters. On April 22, 1961, of 1'925 shells collected, four were of the marked group, with a size range of 17.7 to 20.9 millimeters.

From these preliminary results, it seemed to become apparent that *Olivella* is a relatively slowly growing gastropod, and further, it seemed plausible that a shell of 30 millimeters or over in length might indicate a life span of several years. However, I felt that these experiments were not revealing enough, inasmuch as they gave no information as to the possibility of different growth rates at different stages of development. Such information could be obtained, of course, with individually marked shells; that is, shells whose exact measurement is known initially and which could be positively identified on subsequent recapture. However, as indicated above, all efforts in this direction were unsuccessful. The use of the dental drill for marking the shells seemed to offer a possible way out of the difficulty. On July 3, 1961, 1'350 specimens of *Olivella* ranging in size from 14.0 to 24.0 millimeters were collected at Solano Beach. On July 4 a total of 2'612 individuals ranging over the same measurements were obtained from the Flood Control Channel; all these shells were separated into size classes

of two millimeter range, i. e., 14.1 to 16.0 millimeters, etc., with one exception: the group from 22.1 mm. on up was divided into two classes, namely, 22.1 to 23.0 and 23.1 to 24.0 mm. All 3'967 individuals (1'035 marked and 2'932 unmarked) were liberated in the experimental area in the Flood Control Channel.

The technique employed may be best explained by referring to Figures 1 and 2, Plate 36. The handpiece of the dental drill was securely fastened in a clamp and the shell could be pressed against the rotating drill, either pushing it up at right angles to the longitudinal axis (figure 1) or along an extension of the longitudinal axis (figure 2). By a combination of marks made, it was possible to distinguish the different size classes.

It is planned to endeavor a recapturing of these *Olivellas* at three-month intervals, and it is hoped that the large number of marked specimens, together with the diversity of size classes marked, will make possible a reasonable appraisal of growth rate and life span of *Olivella biplicata*.

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### Literature Cited

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